

What is claimed is:

- 1     1.     An logic unit comprising:  
2           a first logic unit connected to a first supply voltage;  
3           a second logic unit connected to a second supply voltage; and  
4           a voltage-level converter connecting the first logic unit to the second logic unit,  
5     the voltage-level converter including at least one transistor having a threshold voltage  
6     greater than or about equal to the difference between the second supply voltage and the  
7     first supply voltage and the at least one transistor connected to the second supply voltage.
- 1     2.     The logic unit of claim 1, wherein the first logic unit comprises a memory unit.
- 1     3.     The logic unit of claim 2, wherein the second logic unit comprises an arithmetic  
2     unit.
- 1     4.     The logic unit of claim 3, wherein the one transistor comprises an insulated-gate  
2     field-effect transistor.
- 1     5.     The logic unit of claim 4, wherein the insulated-gate field-effect transistor  
2     comprises a *p-type* insulated-gate field-effect transistor.
- 1     6.     The logic unit of claim 1, wherein the voltage-level converter comprises an  
2     inverter.
- 1     7.     The logic unit of claim 6, wherein the inverter comprises an *n-type* insulated-gate  
2     field-effect transistor connected in series with the at least one transistor.
- 1     8.     The logic unit of claim 6, wherein the second logic unit comprises a clock  
2     distribution circuit.

1 9. The logic unit of claim 6, where the voltage-level converter comprises a first  
2 inverter coupled in series to a second inverter.

1 10. The logic unit of claim 9, wherein the first inverter includes the at least one  
2 transistor.

1 11. A logic unit comprising:  
2 a first logic unit connected to a first supply voltage;  
3 a second logic unit connected to a second supply voltage; and  
4 a logic circuit connecting the first logic unit to the second logic unit, the logic  
5 circuit including at least one transistor having a threshold voltage greater than or about  
6 equal to the difference between the second supply voltage and the first supply voltage  
7 and the at least one transistor connected to the second supply voltage .

1 12. The logic unit of claim 11, wherein the logic circuit comprises an AND circuit.

1 13. The logic unit of claim 11, wherein the logic circuit comprises a NAND circuit.

1 14. The logic unit of claim 11, wherein the logic circuit comprises an OR circuit.

1 15. The logic unit of claim 11, wherein the logic circuit comprises a NOR circuit.

1 16. The logic unit of claim 11, wherein the logic circuit comprises an XOR circuit.

1 17. The logic unit of claim 11, wherein the second logic unit comprises a clock  
2 distribution circuit.

1 18. The logic unit of claim 17, wherein the logic circuit comprises a NAND circuit.

1 19. The logic unit of claim 17, wherein the logic circuit comprises a NOR circuit.

1 20. The logic unit of claim 11, wherein the second logic unit comprises an arithmetic  
2 unit.

1 21. The logic unit of claim 20, wherein the logic circuit comprises an OR circuit.

1 22. The logic unit of claim 20, wherein the logic circuit comprises an XOR circuit.

1 23. A method comprising:  
2 transmitting a logic signal from a logic unit having an output voltage swing  
3 between a first voltage level and a second voltage level, the first voltage being greater  
4 than the second voltage level;  
5 receiving the logic signal at a logic circuit having a pull-up transistor and an  
6 output voltage swing between a third voltage level and a fourth voltage level, the third  
7 voltage being greater than the fourth voltage level; and  
8 turning off the pull-up transistor when the logic signal has a value slightly greater  
9 than the difference between the third voltage level and the first voltage level, the third  
10 voltage level being greater than the first voltage level.

1 24. The method of claim 23, further comprising:  
2 generating an output logic signal at the logic circuit, the output logic signal having  
3 a voltage swing between the third voltage level and the fourth voltage level; and  
4 receiving the output logic signal at an inverter having an output voltage swing  
5 between the third voltage level and the fourth voltage level.

1 25. The method of claim 23, further comprising:  
2 generating an output logic signal at the logic circuit, the output logic signal having  
3 a voltage swing between the third voltage level and the fourth voltage level; and  
4 receiving the output logic signal at a logic circuit having an output voltage swing  
5 between the third voltage level and the fourth voltage level.